Utah Renewable Energy Overview: Technology, Resources, and Energy Zones

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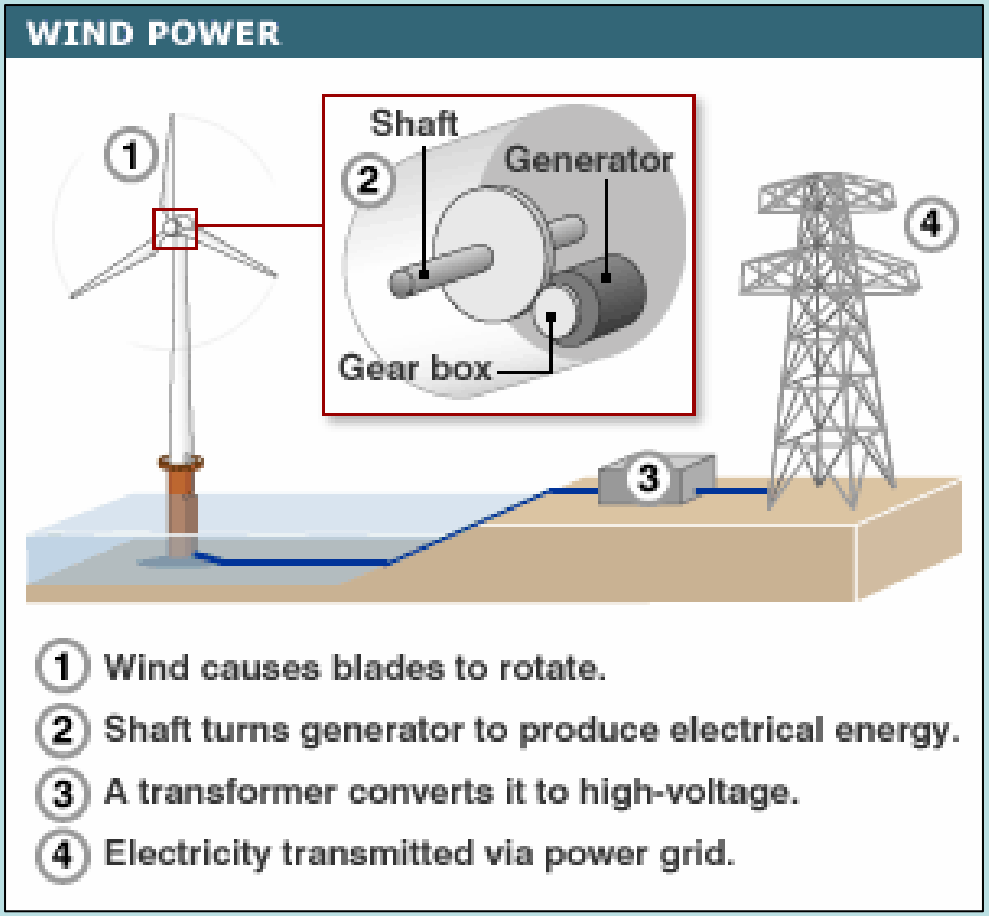
July 30, 2008

UREZ and Renewable Technologies

- UREZ Subgroups: Wind, Solar, Geothermal
  - Technology review
  - Resource review
  - Renewable Energy Zones (REZ) in other States
  - Utah REZ, why?

Wind Energy: How it works

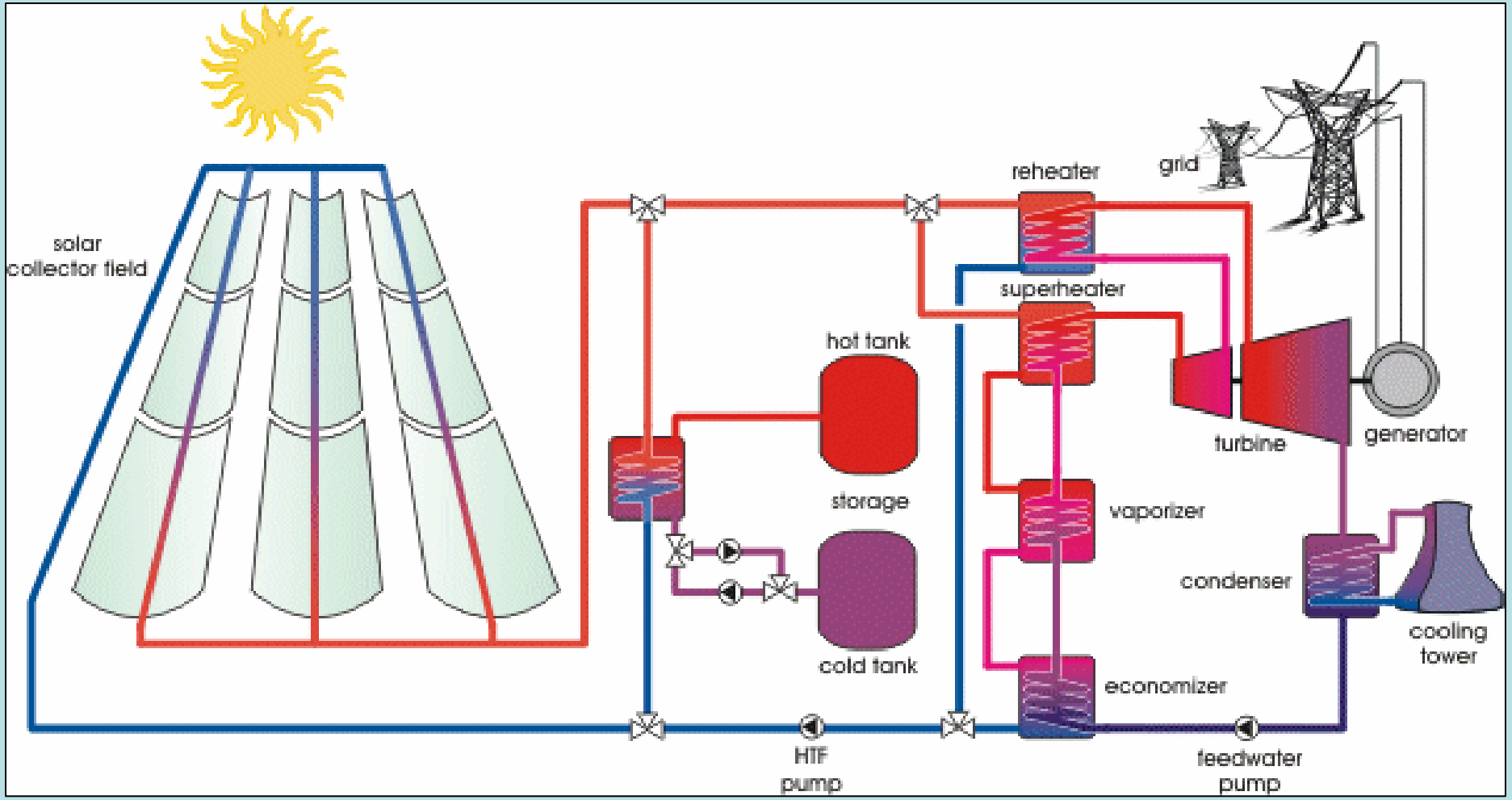


Source: BBC News

Utah's Wind Resources

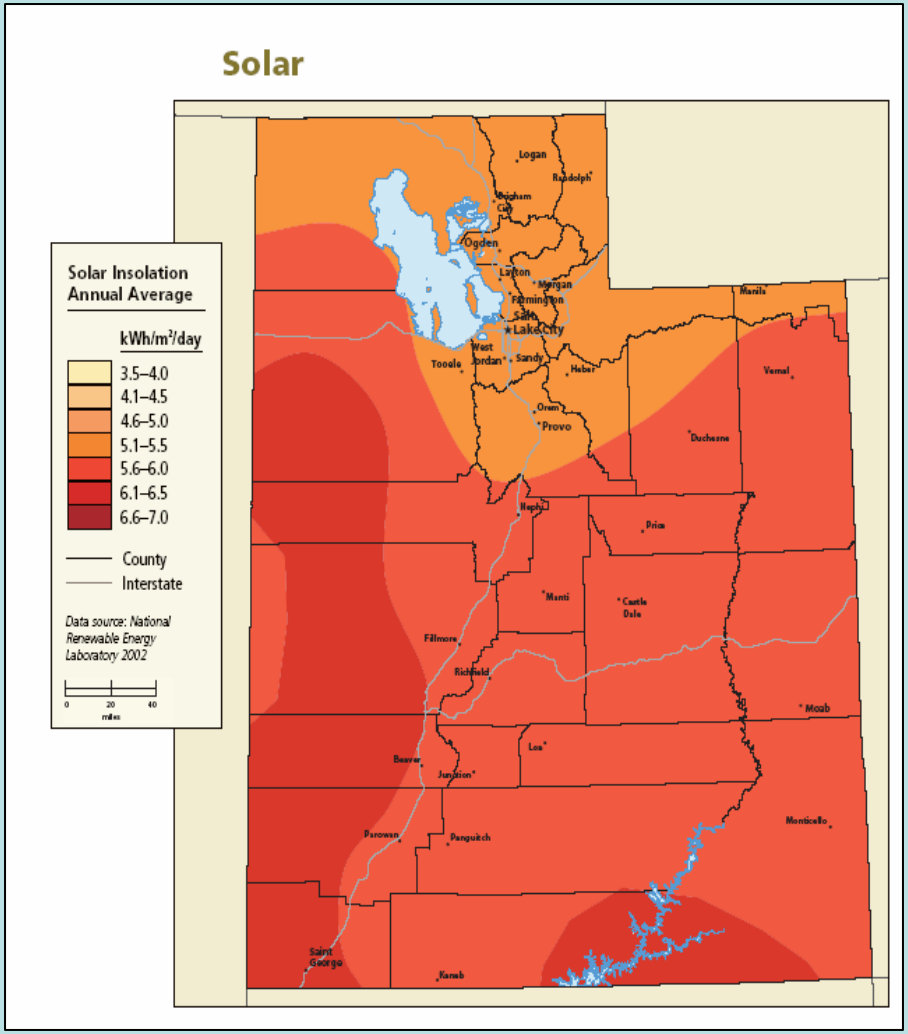
- **Commercial resource in limited areas**
- **19 Megawatts (MW) Developed**
- **Approximately 857.5 MW "In "Progress" in Pacificorp's interconnection queue (four projects)**
- **May reduce peak power demand**
- **Predictable energy production**
- **Stable pricing**
- **Clean energy**
- **Free energy feedstock**
- **Transmission issues (interconnection and location) (Major Barrier to Development)**
- **High initial development cost**

Concentrating Solar Power: How it Works



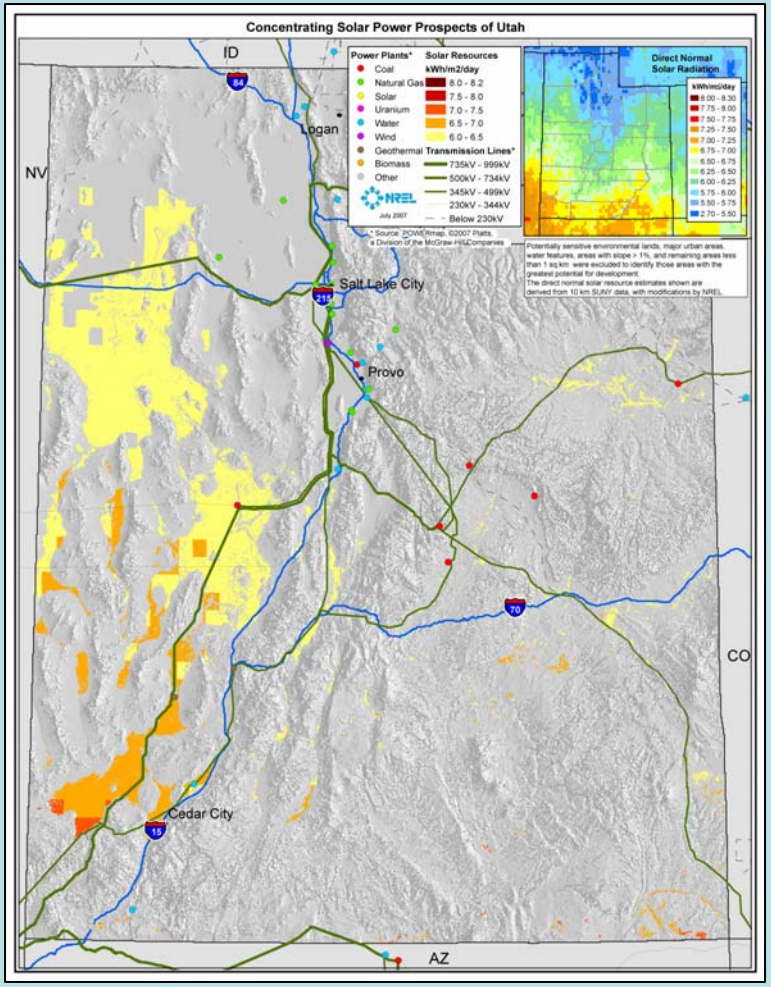
Utah's Solar Resource

- Northern Utah 240+ sunny days/year
- Southern Utah 300 sunny days/year
- Sun+high elevation=high efficiency

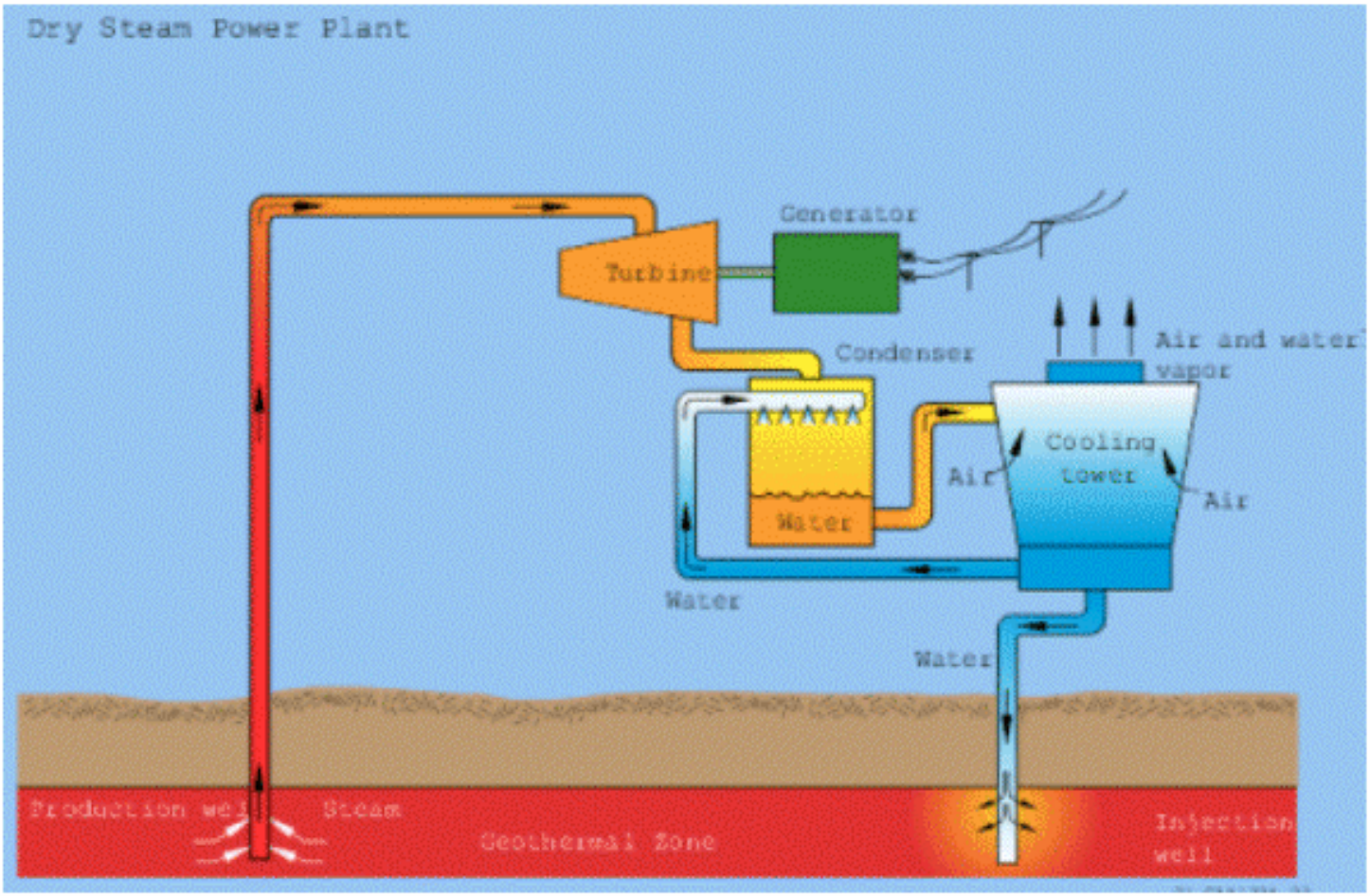


Utah's Solar Resource

- Geographically limited but plenty of resource potential
- No commercial developments in Utah
- Follows peak demand
- Energy storage available
- Predictable production
- Becoming competitive in some markets
- Stable pricing
- Clean energy
- Free energy feedstock
- Transmission issues (interconnection and location) <u>Major Barrier to Development</u>
- High initial development cost <u>Major Barrier to Development</u>



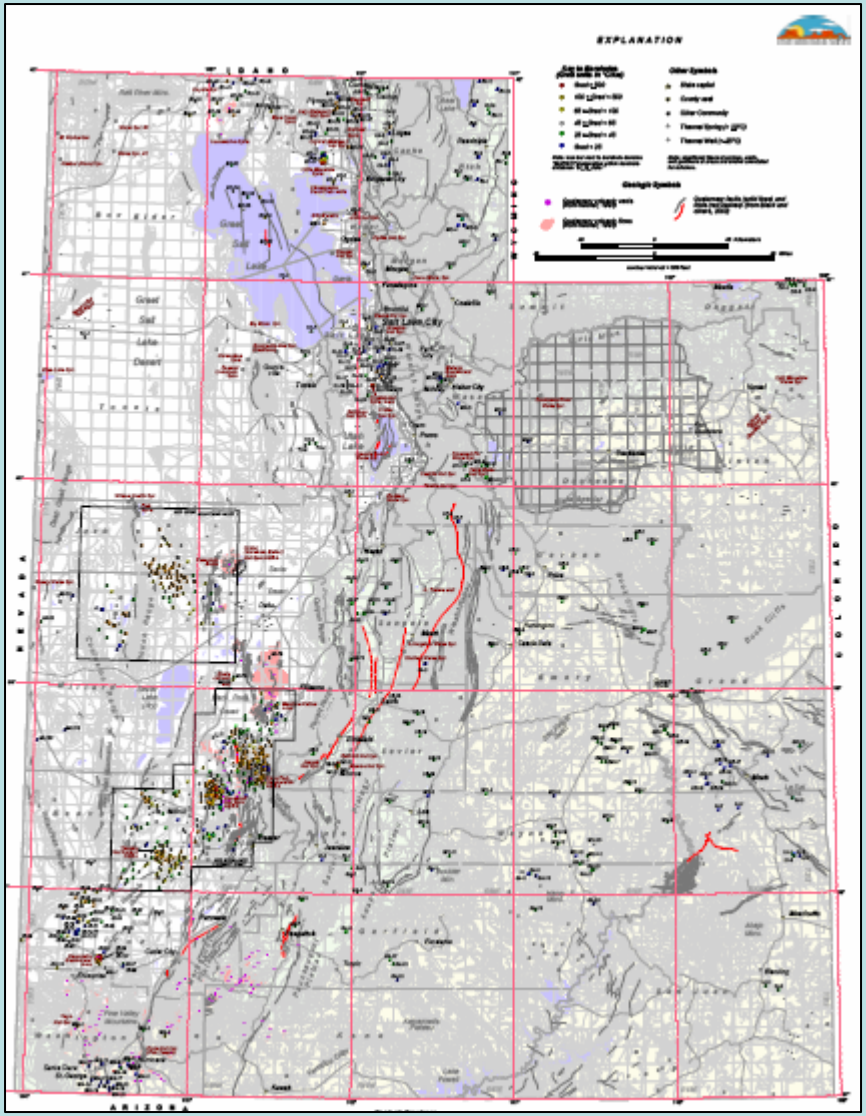
Geothermal Energy: How it Works



Schematic of the Dry Steam Power Plant
Source: Idaho National Engineering and Environmental Laboratory (INEEL)

Utah's Geothermal Resources

- Limited resource area
- 82.5 MW "In Progress" in Pacificorp's interconnection queue
- Base-load generation (similar to coal or gas power plants)
- Clean and reliable
- Stable feedstock
- Stable energy costs
- High upfront costs (drilling)
- Transmission issues (interconnection and location)
- Longer development timeframe than other renewables



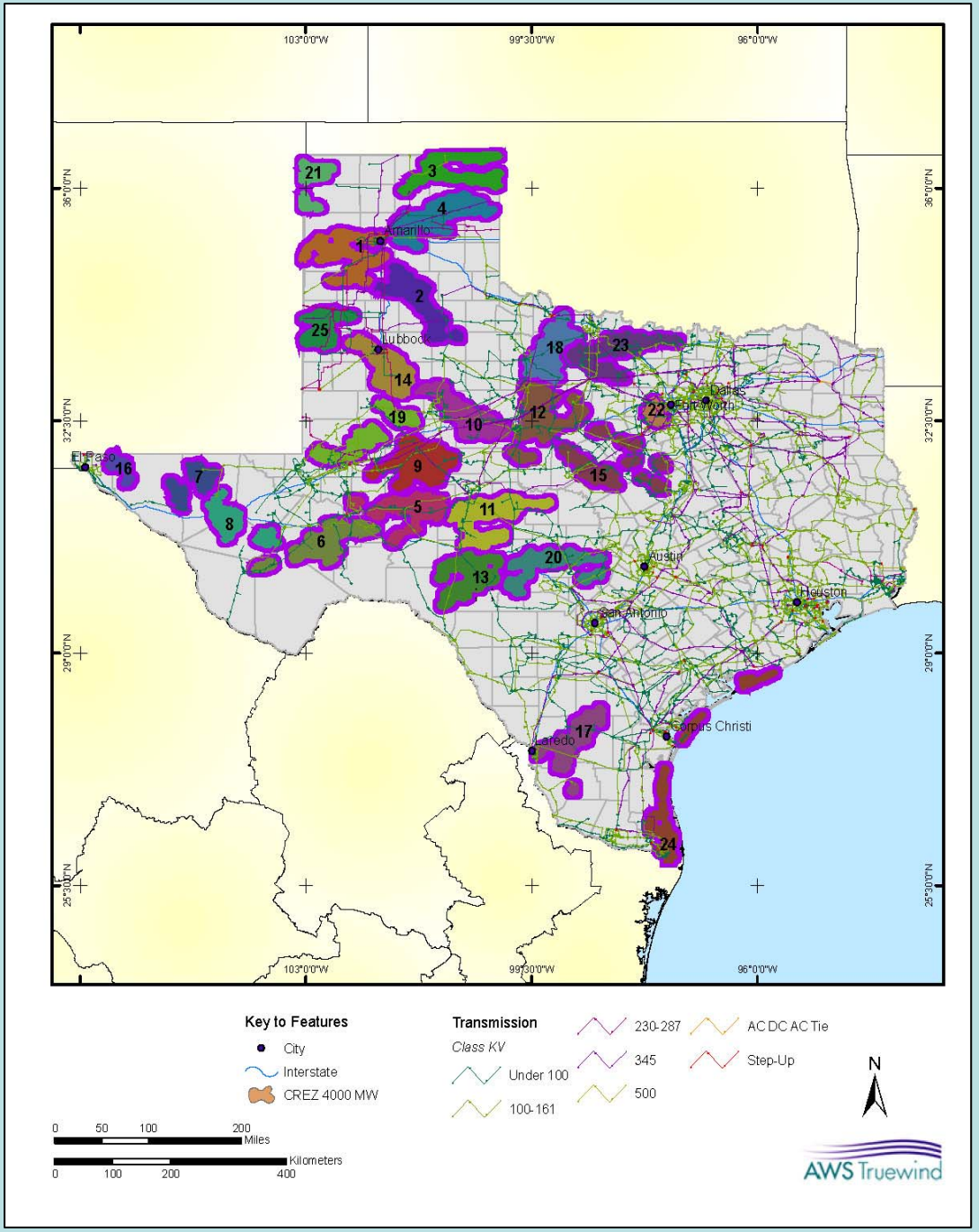
Source: Utah Geological Survey

Renewable Energy Zones: What Are They Good For?

- Renewable Portfolio Standards (RPS)
- Factor slowing RPS compliance & development of renewables = transmission
- Texas was first with the CREZ
- Other states have followed suit: CA, NV, AZ, CO, NM
- End goal = identify multiple projects in a geospatial area (zone) in order to develop transmission and bring energy to market
- Zones are weighted on their cost effectiveness
- TX CREZ required developers to “anti-up” $$ for projects to be considered

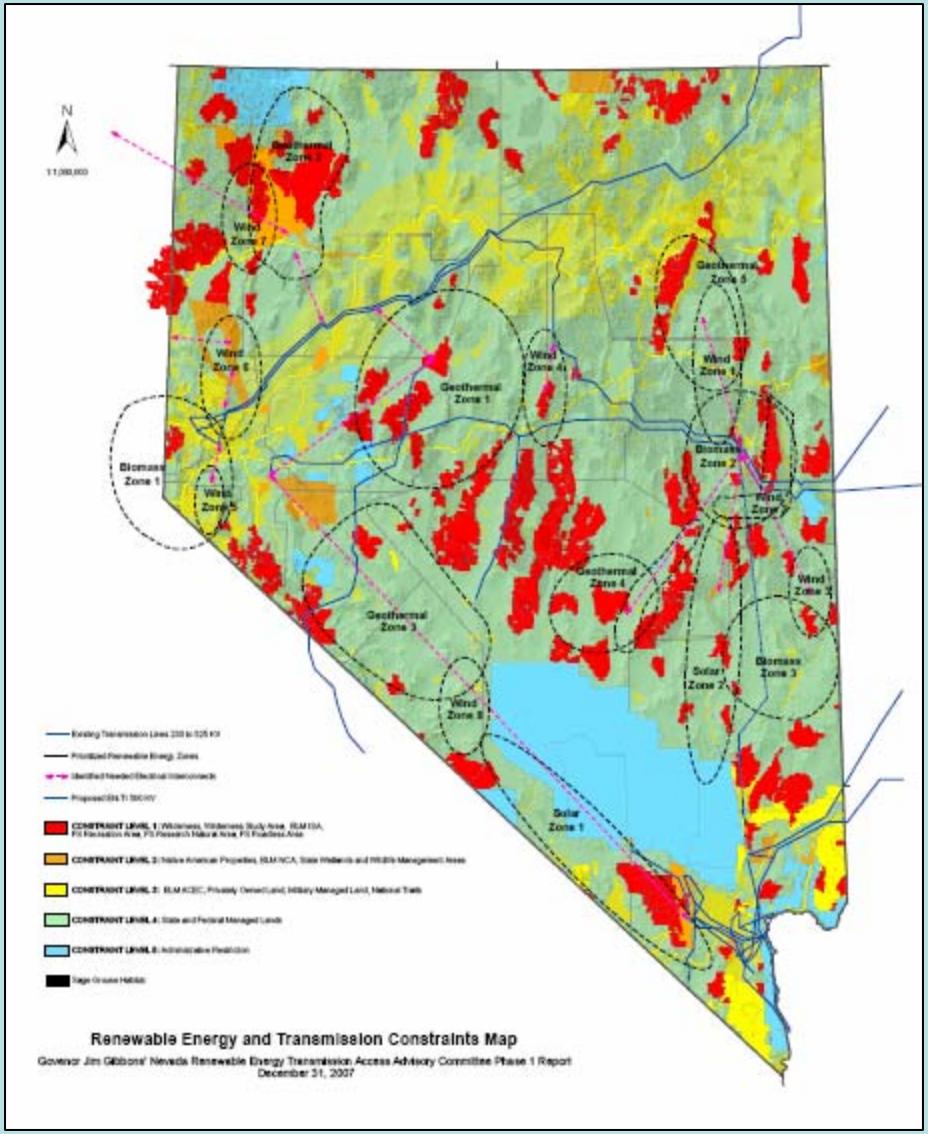
Texas CREZ- Wind Only

- Identified over 24,000 MW of Wind (=>100 MW)
- Identified cost to develop transmission to zones
- Identified cost to ratepayer
- TX PUC approved $5 Billion Dollars worth of Transmission from the CREZ process. (18.5 GW of Wind)
- Transmission will be operational as soon as 2112.



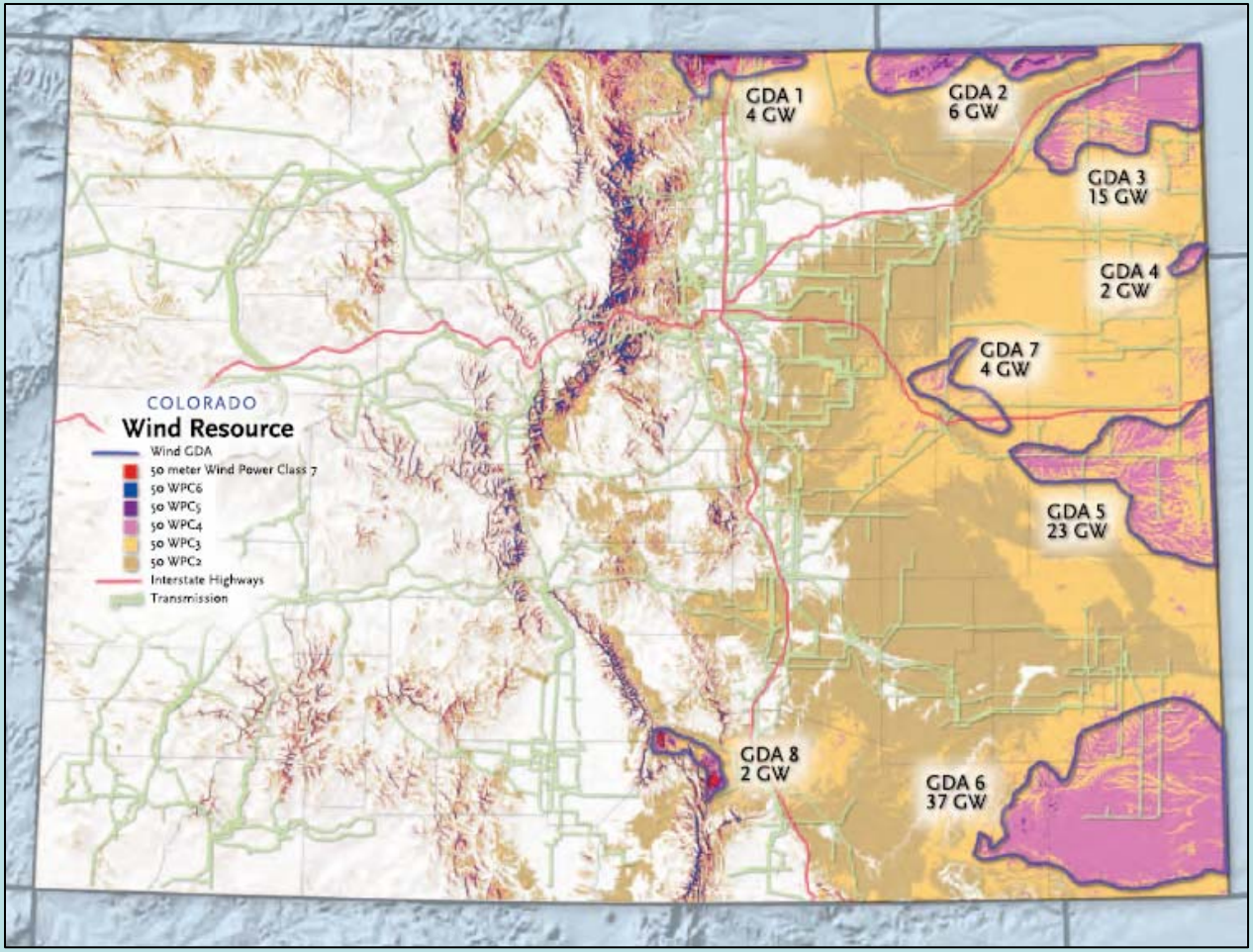
Nevada REZ –Wind, Solar, Biomass, & Geothermal

- Identified zones =>25 miles from 230 kV transmission
- Projects size =>30 MW
- Identified transmission constraints

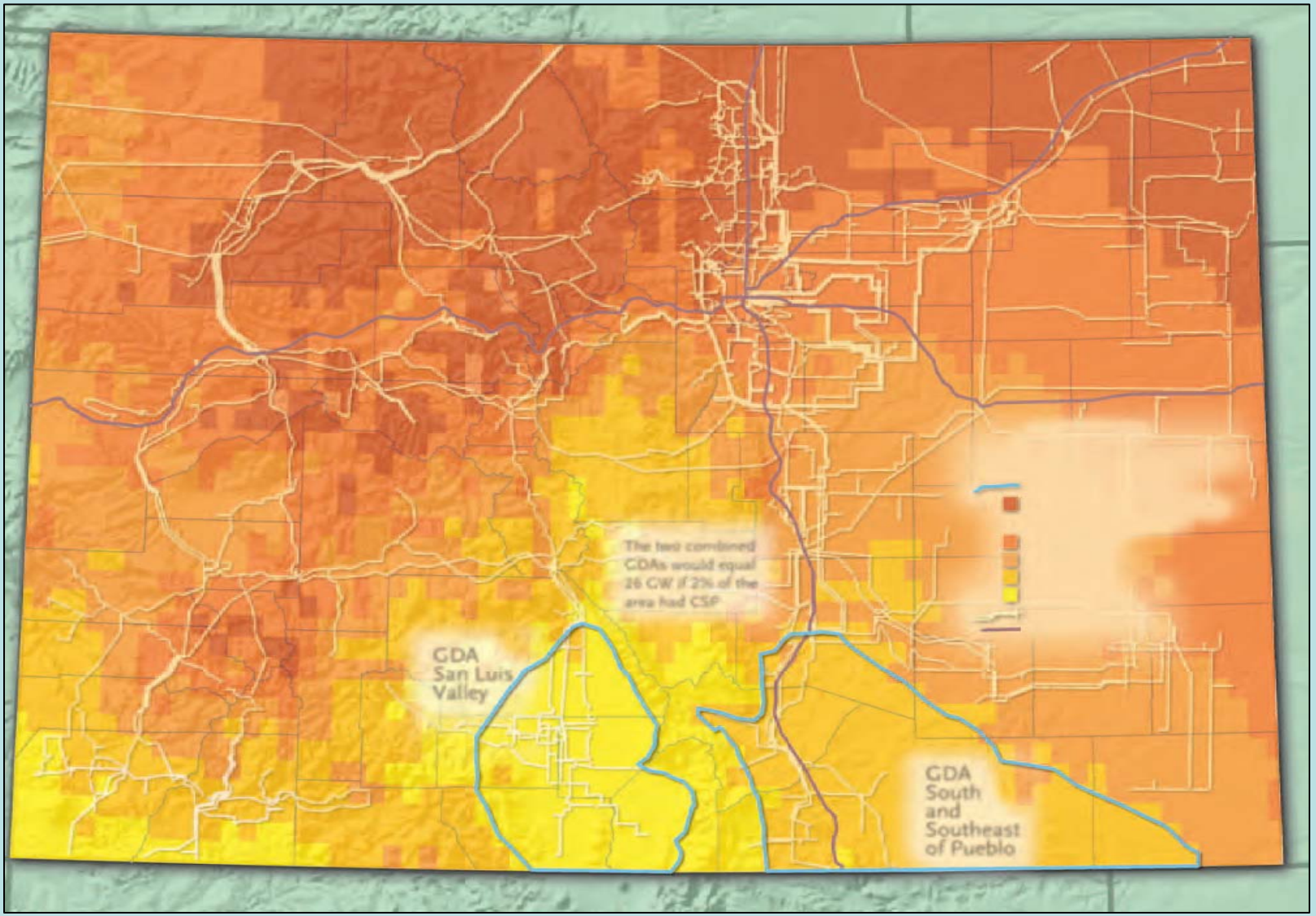


Colorado REZ-Wind & Solar

- 1 Gigawatt threshold

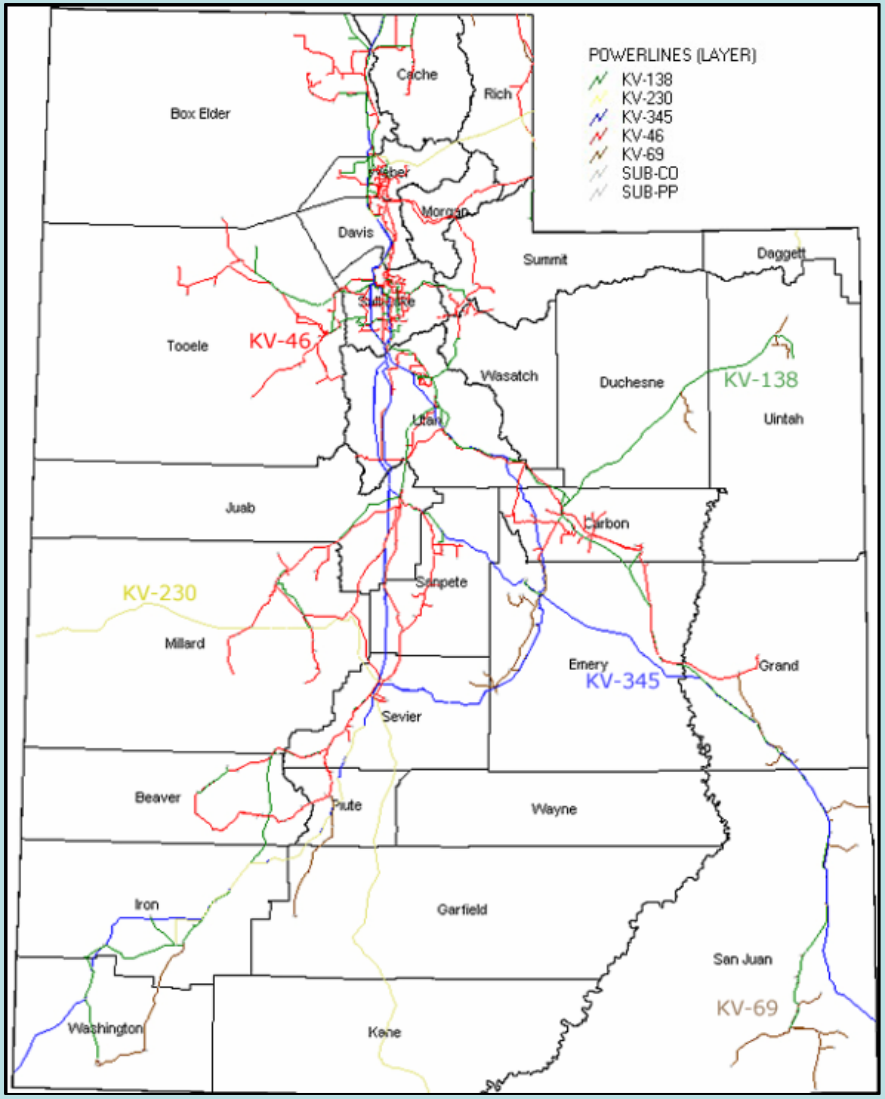


Colorado REZ



So why a have a Utah REZ? Location, Location, Transmission

- Current transmission infrastructure was designed for centralized generation, e.g., coal, hydro, and natural gas.
- Utah renewables are disbursed throughout Utah
- Current transmission constraints limit interconnection opportunities



So why have a Utah REZ?
Future Transmission Development

Product of Utah REZ Task Force

- Identify Utah's large-scale renewable energy potential for wind, solar, and geothermal
- Identify & aggregate individual projects which may allow for more cost effective transmission projects by economically ranking zones (this will not occur in Phase I)